IN THE SPECIFICATION

Please insert the following paragraph at page 1, between lines 5 and 6:

This application is based upon and claims the benefit of priority from the prior Japanese Patent Application Nos. 2001-63992, filed March 7, 2001; and 2002-26563, filed February 4, 2002, and from U.S. Patent Application No. 10/091,501, filed March 7, 2002, the entire contents of which are incorporated herein by reference.

Please replace the paragraph at page 1, lines 8-12, with the following rewritten paragraph:

The present invention relates to a drive power source of a liquid crystal display in an image forming apparatus, that is, ~~an LCD~~ a power source control method for controlling a drive voltage and a control circuit thereof, and an image forming apparatus having the control circuit.

Please replace the paragraph at page 6, lines 18-27, with the following rewritten paragraph:

The present invention has been made to solve such a problem, and therefore has an object to provide ~~an LCD~~ a power source control method in which a residual charge inside a liquid crystal display during power source interruption can be positively removed and power source voltage supply/interruption of each of a logic circuit and a drive circuit can be performed in a correct order with a simply structured circuit, whereby deterioration of the liquid crystal display is minor. Further, the present invention has other objects to provide a control circuit and an image forming apparatus having the control circuit used in the ~~LCD~~ power source control method.

Please replace the paragraph at page 7, lines 1-17, with the following rewritten paragraph:

To achieve the above objects, in the ~~LCD~~ power source control method of the present invention, a voltage of a logic circuit power source in a module is detected by ~~way of~~ a voltage detecting ~~means~~ device to thereby perform supply/interruption of a voltage from ~~an LCD~~ a drive power source to ~~an LCD~~ a control circuit by ~~means of LCD~~ a power source supply/interruption ~~means~~ device. Meanwhile, the residual charge of the ~~LCD~~ drive circuit is forcibly discharged by ~~means of~~ a compulsory discharge ~~means~~ device when the ~~LCD~~ power source supply/interruption ~~means~~ device is performing interruption. Further, in the ~~LCD~~ power source control method, upon detecting a voltage drop of the logic circuit power source, the voltage detecting ~~means~~ device immediately outputs a signal indicating the voltage drop, whereby together with causing the ~~LCD~~ power source supply/interruption ~~means~~ device to be in an interruption state, the compulsory discharge ~~means~~ device is caused to be in an operation state to thereby control a discharge so that the residual charge of the ~~LCD~~ drive circuit is forcibly discharged by ~~means of~~ the compulsory discharge ~~means~~ device before the voltage of the logic circuit power source becomes 0V.

Please replace the paragraph at page 7, lines 18-22, with the following rewritten paragraph:

According to the ~~LCD~~ power source control method, the compulsory discharge of the residual charge of the liquid crystal display can be instantly terminated in the period between times when the voltage detecting ~~means~~ device detects the voltage drop of the logic circuit power source and when the circuit drive voltage becomes 0V.

Please replace the paragraph at page 7, line 23 to page 8, line 10 with the following rewritten paragraph:

According to this result, for example, even if a relatively large number of capacitors are provided inside the LCD (liquid crystal display) for the purpose of enhancing the display quality thereof, the discharge of the residual charge inside the LCD is performed instantaneously and forcibly when the supply of electricity to the LCD is interrupted at the time of power interruption. As a result, the fall of the ~~LCD~~ drive voltage (liquid crystal display drive voltage) is instantaneously performed so that the ~~LCD~~ drive voltage can become 0V before the logic circuit voltage becomes 0V. Therefore, the reverse flow of a current from the drive circuit of the liquid crystal display to the logic circuit when the operation of the liquid crystal display is OFF, that is, when the ~~LCD~~ power source supply/interruption ~~means~~ device is performing interruption is prevented. The destruction of the logic circuit and the liquid crystal display when the operation of the liquid crystal display is OFF is thus prevented.

Please replace the paragraph at page 8, lines 11-18, with the following rewritten paragraph:

Further, in the ~~LCD~~ power source control method, upon detecting a voltage rise of the logic circuit power source, the voltage detecting ~~means~~ device can be rendered to delay the output of a signal of the voltage rise for a fixed time until the voltage of the logic circuit power source becomes stable at a predetermined voltage, whereby together with causing the ~~LCD~~ power source supply/interruption ~~means~~ device to a power supply state, the compulsory discharge ~~means~~ device is caused to be in an open state.

Please replace the paragraph at page 8, lines 19-25, with the following rewritten paragraph:

According to the ~~LCD~~ power source control method, when the operation of the liquid crystal display is ON, that is, when the ~~LCD~~ power source supply/interruption ~~means~~ device is supplying the power source, the reverse flow of a current from the drive circuit to the logic circuit of the liquid crystal display is prevented. The destruction of the logic circuit and the liquid crystal display when the operation of the liquid crystal display is ON is thus prevented.

Please replace the paragraph at page 8, line 26 to page 9, line 17, with the following rewritten paragraph:

Still further, the ~~LCD~~ power source control circuit implementing such a method includes: a plurality of power sources structured so that 2 power sources or more are supplied, having at least the logic circuit power source in a module and the ~~LCD~~ drive power source; voltage detecting ~~means for detecting~~ device to detect a voltage of the logic circuit power source; ~~LCD~~ a power source supply/interruption ~~means for performing~~ device to perform supply/interruption of a voltage from the ~~LCD~~ drive power source to the ~~LCD~~ control circuit; and compulsory discharge ~~means for~~ device to forcibly ~~discharging~~ discharge a residual charge of ~~an LCD~~ a drive circuit when the ~~LCD~~ power source supply/interruption ~~means~~ device is in interruption, wherein the voltage detecting ~~means~~ device can be formed to have a structure in which the voltage detecting ~~means~~ device immediately outputs a signal indicating a voltage drop upon detecting the voltage drop of the logic circuit power source, whereby together with causing the ~~LCD~~ power source supply/interruption ~~means~~ device to be in the interruption state, the compulsory discharge ~~means~~ device is caused to be in the

operation state to thereby forcibly discharge the residual charge of the ~~LCD~~ drive circuit by ~~means of~~ the compulsory discharge ~~means~~ device before the voltage of the logic circuit power source becomes 0V.

Please replace the paragraph at page 9, lines 18-24, with the following rewritten paragraph:

Further, upon detecting a voltage rise of the logic circuit power source, the voltage detecting ~~means~~ device of the ~~LCD~~ power source control circuit delays the output of the signal indicating the voltage rise for a fixed time until the voltage of the logic circuit power source becomes stable at a predetermined voltage, whereby it is possible to control the ~~LCD~~ power source supply/interruption ~~means~~ device to be in the power supply state, and the compulsory discharge ~~means~~ device in the open state.

Please replace the paragraph at page 9, line 25 to page 10, line 14, with the following rewritten paragraph:

Further, the ~~LCD~~ power source control circuit can be structured to have a discharge electric current restriction ~~means~~ device provided therein to prevent a large current from flowing between the ~~LCD~~ power source supply/interruption ~~means~~ device and the compulsory discharge ~~means~~ device when both means are in operation at the same time. According to this structure, a maximum discharge electric current value flowing in the compulsory discharge ~~means~~ device can be set in accordance with the amount of the residual charge of the liquid crystal display to be used because the discharge electric current restriction ~~means~~ device is provided therein. In addition, protection of the compulsory discharge ~~means~~ device can be performed. In other words, when the residual charge of the

liquid crystal display is discharged by ~~means of~~ the compulsory discharge ~~means~~ device, the discharge electric current restriction ~~means~~ device restricts the current flowing in the compulsory discharge ~~means~~ device so that the compulsory discharge ~~means~~ device is not destroyed, whereby damage to the compulsory discharge ~~means~~ device owing to the forced discharge of the residual charge can be prevented beforehand.

Please replace the paragraph at page 10, lines 15-25, with the following rewritten paragraph:

Still further, the ~~LCD~~ power source supply/interruption ~~means~~ device can include a drive switching element connected to the ~~LCD~~ power source, which is switched to the interruption state due to a signal indicating that the voltage detecting ~~means~~ device detects a voltage drop, and which is switched to a discharge state due to a signal indicating that the voltage detecting ~~means~~ device detects a voltage rise. In addition, the compulsory discharge ~~means~~ device can include a discharge switching element connected to earth, which is switched to the operating state due to a signal indicating that the voltage detecting ~~means~~ device detects a voltage drop, and which is switched to the open state due to a signal indicating that the voltage detecting ~~means~~ device detects a voltage rise.

Please replace the paragraph at page 10, line 26 to page 11, line 2, with the following rewritten paragraph:

According to this structure, the supply and interruption of the ~~LCD~~ power source to the ~~LCD~~ drive circuit can be performed with a simple structure, and the discharge of the residual charge of the ~~LCD~~ drive circuit can also be performed with a simple structure.

Please replace the paragraph at page 11, lines 3-18, with the following rewritten paragraph:

Further, the discharge electric current restriction ~~means~~ device can be a resistor connected in series between the ~~LCD~~ power source supply/interruption ~~means~~ device and the compulsory discharge ~~means~~ device. According to this structure, a resistor for restricting a discharge electric current is provided therein, and therefore a resistance value is set in accordance with the amount of the residual charge of the liquid crystal display to be used, whereby a maximum discharge electric current value flowing in the compulsory discharge ~~means~~ device can be simply and easily set. In addition, protection of the compulsory discharge ~~means~~ device can be performed. In other words, when the residual charge of the liquid crystal display is discharged by ~~means~~ device of the compulsory discharge ~~means~~ device, the discharge electric current restriction resistor restricts the current flowing in the compulsory discharge ~~means~~ device so that the compulsory discharge ~~means~~ device is not destroyed, whereby damage to the compulsory discharge ~~means~~ device owing to forced discharge of the residual charge can be prevented beforehand.

Please replace the paragraph at page 11, lines 19-24, with the following rewritten paragraph:

Still further, the ~~LCD~~ power source supply/interruption ~~means~~ device can be formed of a first control switching element, which is connected to earth, and a plurality of resistors in addition to the drive switching element. According to this structure, ON/OFF control of the drive switching element can be easily performed by the first control switching element and the plurality of resistors.

Please replace the paragraph at page 11, line 25 to page 12, line 4, with the following rewritten paragraph:

Further, the compulsory discharge ~~means~~ device can be provided with a second control switching element, which is connected to a control logic circuit power source, and a plurality of resistors in addition to the discharge switching element. According to this structure, the ON/OFF control of the discharge switching element can be easily performed by the second control switching element, which is connected to the control logic circuit power source, and the plurality of resistors.

Please replace the paragraph at page 12, lines 8-22, with the following rewritten paragraph:

Further, the discharge switching element can be a MOS FET also serving as the discharge electric current control resistor due to an internal resistor. According to this structure, when performing forced discharge of the residual charge of the liquid crystal display to be used, the maximum discharge electric current value flowing in the discharge MOS FET can be set in accordance with the amount of the residual charge of the liquid crystal display to be used by selecting the MOS FET which has an internal resistor that is not destroyed by the current flowing therein. In addition, protection of the discharge MOS FET can be conducted. Furthermore, ~~means~~ a device to forcibly discharge the residual charge of the liquid crystal display can be structured at a low cost. Moreover, the structure of the compulsory discharge ~~means~~ device can be simplified by reducing one of the components compared with the one formed of the discharge switching element and the discharge electric current restriction ~~means~~ device.

Please replace the paragraph at page 12, line 23 to page 13, line 1, with the following rewritten paragraph:

Further, the voltage detecting ~~means~~ device can be set so that it judges that a voltage drop has been detected when a voltage VCC of the logic circuit power source becomes lower than a predetermined threshold value and judges that a voltage rise has been detected when the voltage VCC of the logic circuit power source becomes higher than the predetermined threshold value.

Please replace the paragraph at page 13, lines 11-16, with the following rewritten paragraph:

Further, the voltage detecting ~~means~~ device can be structured to share a reset circuit for resetting the logic circuit and control ~~means~~ device thereof when the voltage detecting ~~means~~ device has detected a voltage drop of the logic circuit power source and releasing the reset when a voltage rise has been detected so that the control ~~means~~ device of the logic circuit does not go out of control.

Please replace the paragraph at page 13, lines 17-21, with the following rewritten paragraph:

Still further, a fax that has a copying function and a printing function or a copying machine (image forming apparatus) that has a data transmission function, a copying function, and a printing function can be structured to have the above-mentioned ~~LCD~~ power source control circuit.

Please replace the paragraph at page 13, line 24 to page 14, line 24, with the following rewritten paragraph:

Fig. 1 is a perspective view showing an example of an image forming apparatus having an operation panel control circuit according to the present invention;

Fig. 2 is a plan view showing the operation panel shown in Fig. 1;

Fig. 3 is a sectional view taken along a line A1-A1 of Fig. 2;

Fig. 4 is a schematic view showing a relation between a control circuit of the image forming apparatus and a power source circuit thereof according to the present invention;

Fig. 5 is an explanatory view of the power source circuit (power source unit) of Fig. 4;

Fig. 6 is a detail view of the control circuit of Fig. 4;

Fig. 7 is a detail view of the control circuit of the operation portion of Fig. 6;

Fig. 8A is a further detail circuit diagram of the ~~LCD~~ power source control circuit of Fig. 7;

Fig. 8B is a time chart for explaining an operation of the ~~LCD~~ power source control circuit of Fig. 8A;

Fig. 9 is a further detail circuit diagram of the circuit diagram of Fig. 8A;

Fig. 10 is a time chart for explaining an operation according to the circuit diagram of Fig. 9;

Fig. 11 is a partial control circuit diagram showing another example of the ~~LCD drive voltage~~ electric charge compulsory discharge means shown in Fig. 9;

Fig. 12 is a time chart for explaining an operation of the control circuit diagram shown in Fig. 11; and

Fig. 13 is a circuit diagram of an operation panel control circuit of a conventional image forming apparatus.

Please replace the heading at page 22, line 18, with the following rewritten heading:

<~~LCD~~ power source control circuit (~~LCD~~ voltage control circuit)>

Please replace the paragraph at page 22, lines 19-24, with the following rewritten paragraph:

The operation portion controller 30 has ~~an LCD~~ a power source control circuit (~~LCD~~ voltage control circuit) 49 as display voltage control means. And, the voltage +24V of the power source unit 28 is applied to the liquid crystal display (LCD) 13 as a drive voltage via the ~~LCD~~ power source control circuit 49. The ~~LCD~~ power source control circuit 49 will be further described in detail in the following.

Please replace the paragraph at page 22, line 25 to page 23, line 7, with the following rewritten paragraph:

As shown in Fig. 8A, the ~~LCD~~ power source control circuit 49 includes ~~an LCD~~ a drive power source supply/interruption circuit (~~LCD~~ drive voltage supply/interruption means) 50 serving as ~~LCD~~ drive voltage interruption means, and ~~LCD~~ electric charge compulsory discharge means (~~LCD~~ residual charge compulsory discharge means) C. Further, the ~~LCD~~ electric charge compulsory discharge means C includes a discharge electric current restriction circuit 51 as discharge electric current restriction means and an ~~LCD~~ electric charge compulsory discharge circuit 52 as substantial ~~LCD~~ residual charge discharge means.

Please replace the paragraph at page 23, lines 8-21, with the following rewritten paragraph:

On the input side of the ~~LCD~~ drive power source supply/interruption circuit 50 for controlling the ~~LCD~~ drive voltage, the voltage +24V of the power source unit 28 is applied thereto. The output side of the ~~LCD~~ drive power source supply/interruption circuit 50 is connected to a drive circuit (not shown) of the liquid crystal display (LCD) 13 and earthed as well via the discharge electric current restriction circuit 51 and the ~~LCD~~ electric charge compulsory discharge circuit 52. By forming such a structure, a large penetrating current is prevented from flowing between the ~~LCD~~ drive power source and the earth GND at a time in which the ~~LCD~~ drive power source supply/interruption circuit 50 and the ~~LCD~~ electric charge compulsory discharge circuit 52 are both changed to thereby prevent the liquid crystal display (LCD) 13, the power source control circuit 49, and the like from deteriorating.

Please replace the paragraph at page 23, line 22 to page 24, line 2, with the following rewritten paragraph:

A reset IC (reset circuit), for example, is employed as the logic voltage detecting circuit 47 in the present embodiment, however, it does not necessarily have to be a reset IC. In the present embodiment, a reset signal "L" or "H" is outputted from the logic voltage detecting circuit 47 as a logic voltage detecting signal. The logic voltage detecting signal is fed to a control signal input side of the ~~LCD~~ drive power source supply/interruption circuit 50 and to a control signal input side of the ~~LCD~~ electric charge compulsory discharge circuit 52.

Please replace the paragraph at page 24, lines 3-11, with the following rewritten paragraph:

The voltage +24V of the power source unit 28 is applied to the circuit (not shown) of the liquid crystal display (LCD) 13 as a drive voltage VEE via the ~~LCD~~ drive power source supply/interruption circuit 50 when the ~~LCD~~ drive power source supply/interruption circuit 50 is ON. In other words, the ~~LCD~~ drive power source supply/interruption circuit 50 is rendered ON when the reset signal from the logic voltage detecting circuit 47 becomes "H" and outputs the voltage +24V as the drive voltage VEE. The drive voltage VEE is then applied to the circuit (not shown) of the liquid crystal display (LCD) 13.

Please replace the paragraph at page 24, lines 12-20, with the following rewritten paragraph:

Further, when the ~~LCD~~ drive power source supply/interruption circuit 50 is OFF, the drive voltage VEE fed to the drive circuit (not shown) of the liquid crystal display (LCD) 13 via the ~~LCD~~ drive power source supply/interruption circuit 50 is caused to be interrupted. In other words, the ~~LCD~~ drive power source supply/interruption circuit 50 is rendered OFF when the reset signal from the logic voltage detecting circuit 47 becomes "L" and stops the output of the drive voltage VEE, thereby interrupting the drive voltage VEE applied to the drive circuit (not shown) of the liquid crystal display (LCD) 13.

Please replace the paragraph at page 24, line 21 to page 25, line 3, with the following rewritten paragraph:

The ~~LCD~~ electric charge compulsory discharge circuit 52 is rendered ON when the reset signal from the logic voltage detecting circuit 47 becomes "L" and forcibly discharge

the residual charge of the drive voltage VEE, that is, the residual charge of the drive circuit (not shown) of the liquid crystal display (LCD) 13 via the discharge electric current restriction circuit 51. Also, when the reset signal from the logic voltage detecting circuit 47 becomes "H", the ~~LCD~~ electric charge compulsory discharge circuit 52 for controlling the ~~LCD~~ drive voltage is rendered OFF, whereby the drive voltage VEE is applied normally to the circuit of the liquid crystal display (LCD) 13 not shown in the drawing.

Please replace the paragraph at page 25, lines 4-14, with the following rewritten paragraph:

Besides, provision is made so that when the discharge electric current restriction circuit 51 forcibly discharges the residual charge created by the drive voltage VEE, the penetrating current is caused to be lower than an electric current value permissible to the ~~LCD~~ electric charge compulsory discharge circuit 52, and even in the case when both the ~~LCD~~ drive power source supply/interruption circuit 50 and the ~~LCD~~ electric charge compulsory discharge circuit 52 are rendered ON simultaneously at a timing in which the reset signal switches from "H" to "L", the penetrating current is caused to be lower than the electric current value of both circuits so as not to destroy both circuits 50 and 52.

Please replace the paragraph at page 27, lines 18-20, with the following rewritten paragraph:

Meanwhile, the reset signal "H" is fed to the ~~LCD~~ drive power source supply/interruption circuit 50 and the ~~LCD~~ electric charge compulsory discharge circuit 52 at the time t3.

Please replace the paragraph at page 27, line 21 to page 28, line 4, with the following rewritten paragraph:

The ~~LCD~~ drive power source supply/interruption circuit 50 is rendered ON when the reset signal from the logic voltage detecting circuit 47 turns to "H" at a time t3, and outputs the +24V as a drive voltage VEE to thereby apply the drive voltage VEE to the drive circuit (not shown) of the liquid crystal display (LCD) 13. Further, the ~~LCD~~ electric charge compulsory discharge circuit 52 is rendered OFF when the reset signal from the logic voltage detecting circuit 47 turns to "H" at the time t3 so as to normally apply the drive voltage VEE to the drive circuit (not shown) of the liquid crystal display (LCD) 13. The drive voltage VEE increases (increase voltage) from the time t3 and becomes a maximum +24V at a time t4.

Please replace the paragraph at page 29, lines 21-23, with the following rewritten paragraph:

Meanwhile the reset signal "L" is fed to the ~~LCD~~ drive power source supply/interruption circuit 50 and the ~~LCD~~ electric charge compulsory discharge circuit 52 at the time t7.

Please replace the paragraph at page 29, line 24 to page 30, line 17, with the following rewritten paragraph:

The ~~LCD~~ drive power source supply/interruption circuit 50 is immediately rendered OFF once the reset signal from the logic voltage detecting circuit 47 turns to "L" at the time t7 to thereby interrupt the drive voltage VEE (+24V) applied as the drive voltage VEE to the drive circuit (not shown) of the liquid crystal display (LCD) 13 at the time t7. At the same

time, the ~~LCD~~ electric charge compulsory discharge circuit 52 is rendered ON when the reset signal from the logic voltage detecting circuit 47 turns to "L" at the time t7 to thereby forcibly discharge the residual charge of the drive voltage VEE, in other words, to forcibly discharge the residual charge of the drive circuit (not shown) of the liquid crystal display (LCD) 13 via the discharge electric current restriction circuit 51. At this point, though the voltage VCC of the LCD/touch panel controller 44 becomes 0V at the time t9, forced discharge is precipitately performed so that the residual charge of the drive voltage VEE can become 0V at the time t8 much earlier than the time t9. Therefore, the reverse flow of a current from the liquid crystal display (LCD) 13 to the logic circuits of the operation portion controller 30 including the LCD/touch panel controller 44 when the drive voltage of the liquid crystal display (LCD) 13 is OFF is prevented, whereby deterioration of the logic circuits and the liquid crystal display (LCD) 13 when the liquid crystal display (LCD) 13 is turned OFF is prevented.

Please replace the paragraph at page 30, line 18 to page 31, line 1, with the following rewritten paragraph:

Further, when performing forced discharge, the discharge electric current restriction circuit 51 restricts the discharge current so that it becomes lower than the electric current value permissible to the ~~LCD~~ electric charge compulsory discharge circuit 52. Even in the case when both the ~~LCD~~ drive power source supply/interruption circuit 50 and the ~~LCD~~ electric charge compulsory discharge circuit 52 are rendered ON simultaneously at a timing when the reset signal is switched from "H" to "L", the discharge electric current restriction circuit 51 restricts the penetrating current causing the current value thereof to be lower than

the permissible electric current value of both circuits so as not to destroy both circuits 50 and 52.

Please replace the paragraph at page 31, lines 2-11, with the following rewritten paragraph:

(iv) Thus, the ~~LCD~~ voltage control circuit includes the power source +24V (display drive power source) of the power source unit 28 for applying the display drive voltage to the liquid crystal display (LCD) 13, the operation portion controller (logic circuit) 30 for controlling the operation of the liquid crystal display (LCD) 13, the power source of the voltage +5V (logic circuit power source) of the power source unit 28 for applying the circuit drive voltage to the operation portion controller 30, and the logic circuit voltage detecting circuit (voltage detecting means) 47 for detecting the circuit drive voltage applied to the operation portion controller 30.

Please replace the paragraph at page 31, lines 12-15, with the following rewritten paragraph:

In addition to the structure, the ~~LCD~~ voltage control circuit includes the ~~LCD~~ drive power source supply/interruption circuit (drive voltage supply/interruption means) 50 which is operated by a detected voltage from the logic circuit voltage detecting circuit 47.

Please replace the paragraph at page 31, line 16 to page 32, line 11, with the following rewritten paragraph:

Moreover, the ~~LCD~~ drive power source supply/interruption circuit (drive voltage supply/interruption means) 50 can be controlled so that it is in the interruption state from the

time the logic circuit voltage detecting circuit 47 detects a voltage rise of the circuit drive voltage VCC of the power source of the voltage +5V (logic circuit power source) of the power source unit 28 (power source for the logic circuit) during the ON operation thereof until the circuit drive voltage VCC becomes stable as described above without applying the drive voltage from the power source of +24V (display drive power source) of the power source unit 28 to the liquid crystal display (LCD) 13. Next, the ~~LCD~~ drive power source supply/interruption circuit (drive voltage supply/interruption means) 50 can be controlled to start operating at the point in which the logic circuit voltage VCC rises and becomes stable to thereby apply the drive voltage from the power source of +24V (display drive power source) of the power source unit 28 to the liquid crystal display (LCD) 13. Therefore, through such control, the reverse flow of a current from the ~~LCD~~ drive circuit of the liquid crystal display (LCD) 13 to the logic circuit of the operation portion controller 30 including from the liquid crystal display (LCD) 13 to the LCD/touch panel controller 44 at the time of starting the operation of the liquid crystal display (LCD) 13 can be prevented, whereby deterioration of the logic circuits and the liquid crystal display (LCD) 13 at the operation start time of the liquid crystal display (LCD) 13 is prevented.

Please replace the paragraph at page 32, lines 12-20, with the following rewritten paragraph:

The ~~LCD~~ drive power source supply/interruption circuit (drive voltage supply/interruption means) 50 can be controlled so that the display drive voltage from the power source of +24V (display drive power source) of the power source unit 28 applied to the liquid crystal display (LCD) 13 is interrupted once the logic circuit voltage detecting circuit 47 detects a voltage drop of the circuit drive voltage during the OFF operation of the power

source of the voltage +5V (logic circuit power source) of the power source unit 28 (logic circuit power source) as described above.

Please replace the paragraph at page 32, lines 21-26, with the following rewritten paragraph:

Still further, when the logic circuit voltage detecting circuit (voltage detecting means) 47 detects the voltage drop of the power source of the power voltage +5V (logic circuit power source), the structure of the ~~LCD~~ control circuit can be formed to constitute the ~~LCD~~ electric charge compulsory discharge means C which forcibly discharges the residual charge of the liquid crystal display (LCD) 13.

Please replace the paragraph at page 32, line 27 to page 33, line 4, with the following rewritten paragraph:

Accordingly, the ~~LCD~~ drive voltage can be caused to attenuate faster than the fall of the power source of the power voltage +5V of the power source unit 28 (logic circuit power source), that is, the logic power source of the LCD, and therefore the liquid crystal display (LCD) 13 will not be damaged.

Please replace the paragraph at page 33, lines 5-22, with the following rewritten paragraph:

By forming the structure as the above, when the logic circuit voltage detecting circuit (voltage detecting means) 47 detects the voltage drop of the power source of the power voltage +5V (logic circuit power source), the ~~LCD~~ electric charge compulsory discharge means C forcibly starts the discharge of the residual charge of the liquid crystal display

(LCD) 13, and from the time when the logic circuit voltage detecting circuit (voltage detecting means) 47 detects the voltage drop of the power source of the power voltage +5V (logic circuit power source) to the time before the circuit drive voltage VCC becomes 0V, the ~~LCD~~ electric charge compulsory discharge means C forcibly terminates the discharge of the residual charges instantaneously so that the display drive voltage becomes almost 0V. Therefore, the reverse flow of a current from the liquid crystal display (LCD) 13 to the logic circuit of the operation portion controller 30 including the LCD/touch panel controller 44 when the drive voltage of the liquid crystal display (LCD) 13 is OFF is prevented, whereby deterioration of the logic circuits and the liquid crystal display (LCD) 13 when the liquid crystal display (LCD) 13 is turned OFF is prevented.

Please replace the paragraph at page 34, lines 7-15, with the following rewritten paragraph:

The ~~LCD~~ power source control circuit 49 shown in Fig. 8A can also be formed to have a structure as shown in Fig. 9. That is to say, the ~~LCD~~ drive power source supply/interruption circuit (~~LCD~~ drive voltage supply/interruption means) 50 serving as the ~~LCD~~ drive voltage supply/interruption means, the discharge electric current restriction circuit 51 as the discharge electric current restriction means, the ~~LCD~~ electric charge compulsory discharge circuit 52 as the ~~LCD~~ drive voltage discharge means, and the like of Fig. 8A can be structured as shown in Fig. 9.

Please replace the paragraph at page 34, line 16 to page 35, line 2, with the following rewritten paragraph:

As shown in Fig. 9, the ~~LCD~~ drive power source supply/interruption circuit 50 includes a transistor Q1 as a first switching element of the drive voltage interruption (for drive voltage control) and a MOS FET Q2 (hereinafter simply abbreviated as FET Q2) as a second switching element (transistor) of the drive voltage interruption (for drive voltage control). At a base of the transistor Q1, the logic voltage detecting signal indicating that the logic voltage detecting circuit 47 is inputted therein via a resistor R1. An emitter of the transistor Q1 is earthed. Further, a collector of the transistor Q1 is connected to a gate of the FET Q2 via a resistor R2 and a source of FET Q2 is connected to a gate of the FET Q2 via a resistor R3. It is to be noted that the above-mentioned power source voltage VCC (+5V) of the power source unit (PSU) 28 is applied to the logic voltage detecting circuit 47.

Please replace the paragraph at page 35, lines 7-16, with the following rewritten paragraph:

The ~~LCD~~ electric charge compulsory discharge circuit 52 includes transistors Q3 and Q4 as the first and second switching elements, respectively, for discharging a residual charge (for controlling a drive voltage). At a base of the transistor Q3, the logic voltage detecting signal of the logic voltage detecting circuit 47 is inputted therein via a resistor R4. An emitter of the transistor Q3 is connected to the base of the transistor Q3 via a resistor R5. The above-mentioned power source voltage VCC (+5V) of the power source unit (PSU) 28 is applied to the emitter of the transistor Q3 and to the base of the transistor Q3 via the resistor R5.

Please replace the paragraph at page 36, lines 2-4, with the following rewritten paragraph:

The operation of the ~~LCD~~ power source control circuit 49 having such a structure will be described next.

Please replace the paragraph at page 38, lines 8-12, with the following rewritten paragraph:

In the meantime, the voltage of the reset signal "H" is simultaneously applied to the transistor Q1 of the ~~LCD~~ drive power source supply/interruption circuit 50 via the resistor R1 and the transistor Q3 of the ~~LCD~~ electric charge compulsory discharge circuit 52 via the resistor R4 at the time t3.

Please replace the paragraph at page 38, line 25 to page 39, line 7, with the following rewritten paragraph:

Further, the transistor Q3 of the ~~LCD~~ electric charge compulsory discharge circuit 52 is rendered OFF when the reset signal from the logic voltage detecting circuit 47 turns to "H" at the time t3 and the power source voltage VCC that was applied to the base of the transistor Q4 is interrupted, whereby the transistor Q4 is turned OFF. Accordingly, the drive voltage VEE, which will be outputted from the FET Q2, can be normally applied to the drive circuit (not shown) of the liquid crystal display (LCD) 13. The drive voltage VEE starts rising (increase voltage) from the time t3 and becomes a maximum +24V at the time t4.

Please replace the paragraph at page 40, lines 20-24, with the following rewritten paragraph:

In the meantime, the voltage of the reset signal "L" is applied to the base of the transistor Q1 of the ~~LCD~~ drive power source supply/interruption circuit 50 via the resistor R1 as well as to the base of the transistor Q3 of the ~~LCD~~ electric charge compulsory discharge circuit 52 via the resistor R4 at the time t7.

Please replace the paragraph at page 40, line 25 to page 41, line 8, with the following rewritten paragraph:

The transistor Q1 of the ~~LCD~~ drive power source supply/interruption circuit 50 is rendered OFF when the reset signal from the logic voltage detecting circuit 47 turns to "L" at the time t7. Accordingly, the power source voltage +24V of the power source unit 28 is applied to the gate of the FET Q2 via the resistor R3 and the conductivity between the source and drain of the FET Q2 is interrupted, whereby the FET Q2 is turned OFF. Consequently, the FET Q2 stops the output of the drive voltage VEE (+24V) from the drain thereof, thereby interrupting the drive voltage VEE (+24V), which is applied to the drive circuit (not shown) of the liquid crystal display (LCD) 13 as the drive voltage VEE.

Please replace the paragraph at page 41, lines 9-25, with the following rewritten paragraph:

Simultaneously, the transistor Q3 of the ~~LCD~~ electric charge compulsory discharge circuit 52 is rendered ON when the reset signal from the logic voltage detecting circuit 47 turns to "L" at the time t7 to thereby apply the power source voltage VCC to the base of the transistor Q4 via the transistor Q3 and the resistor R6. Accordingly, the transistor Q4 is

turned ON, whereby the drain of the FET Q2 is in conductivity to the earth via the discharge electric current restriction resistor RL. Accordingly, the residual charge brought about by the drive voltage VEE, that is, the residual charge of the drive circuit (not shown) of the liquid crystal display (LCD) 13 is forcibly discharged to the earth by the discharge electric current restriction resistor RL, which is the discharge electric current restriction circuit), via the transistor Q4. At this point, since the residual charges brought about by the drive voltage VEE are caused to flow to the earth by the maximum current value restricted at the discharge electric current restriction resistor RL, the drive voltage VEE drops precipitately and reaches 0V at a time t8.

Please replace the paragraph at page 42, lines 3-15, with the following rewritten paragraph:

Incidentally, when there is not provision of a compulsory discharge circuit such as the ~~LCD~~ electric charge compulsory discharge circuit 52, then the residual charge brought about by the drive voltage VEE, that is, the residual charge of the unillustrated drive circuit of the liquid crystal display (LCD) 13 will slowly drop between the time t6 and t10, and hence a voltage due to the residual charge of the unillustrated drive circuit of the liquid crystal display (LCD) 13 will not become 0V even if the voltage VCC of the LCD/touch panel controller 44 becomes 0V at the time t9. However, according to the present invention, the residual charge of the drive voltage VEE is precipitately discharged between the time t7 and t8 and becomes 0V at the time t8 long before the voltage VCC of the LCD/touch panel controller 44 becomes 0V at the time t9.

Please replace the paragraph at page 42, line 25 to page 43, line 11, with the following rewritten paragraph:

Further, when performing forced discharge, the discharge electric current restriction resistor RL, which is the discharge electric current restriction circuit, restricts the discharge electric current so that it becomes lower than the electric current value permissible to the transistor Q4 of the ~~LCD~~ electric charge compulsory discharge circuit 52. Even when the FET Q2 of the ~~LCD~~ drive power source supply/interruption circuit 50 and the transistor Q4 of the ~~LCD~~ electric charge compulsory discharge circuit 52 are simultaneously rendered ON at a timing when the reset signal is switched from "H" to "L", the discharge electric current restriction resistor RL restricts the penetrating current of the FET Q2 and the transistor Q4 so that it becomes lower than the electric current value permissible to the FET Q2 and the transistor Q4, whereby both the FET Q2 and the transistor Q4 will not be destroyed.

Please replace the paragraph at page 47, line 26 to page 48, line 24, with the following rewritten paragraph:

In the ~~LCD~~ power source control method of the present invention, the voltage detecting means (logic voltage detecting circuit 47) detects the voltage VCC of the +5V logic circuit power source of the power source unit 28 in the module, the supply/interruption of the voltage VEE of the +24V power source thereof from the ~~LCD~~ drive power source to the ~~LCD~~ control circuit (drive circuit of the liquid crystal display not shown in the drawing) is performed by the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption means 50). Meanwhile, the residual charge of the ~~LCD~~ drive circuit is forcibly discharged by means of the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) as well when the aforementioned ~~LCD~~ power source supply/interruption

means (~~LCD~~ drive power source supply/interruption means 50) is performing interruption. Moreover, in the ~~LCD~~ power source control method, upon detecting a voltage drop of the logic circuit power source, the aforementioned voltage detecting means (logic voltage detecting circuit 47) immediately outputs a signal indicating the voltage drop (reset signal "L"), whereby together with causing the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption means 50) to be in the interruption state, the compulsory discharge means (~~LCD~~ electric charge compulsory discharge circuit 52) is caused to be in the operation state to thereby control discharge so that the residual charge of the ~~LCD~~ drive circuit is forcibly discharged by means of the compulsory discharge means (~~LCD~~ electric charge compulsory discharge circuit 52) before the voltage of the logic circuit power source becomes 0V.

Please replace the paragraph at page 48, line 25 to page 49, line 9, with the following rewritten paragraph:

Herein, for example, the liquid crystal display module is formed of a glass substrate provided with a pair of electrode plates having a transparent conductive film disposed thereon as a plurality of electrodes and a liquid crystal layer, a polarizing plate, and the like arranged between the electrode plates. Such a liquid crystal display has a capacitance of a high resistance. A structure of an equivalent circuit composed of the electrode plate and the liquid crystal layer of the liquid crystal display can be shown as a parallel circuit of a resistor and a capacitor. The structure of the ~~LCD~~ control circuit (~~LCD~~ drive circuit) for controlling and driving the liquid crystal itself in such manner becomes a structure including a pair of electrode plates and the liquid crystal layer.

Please replace the paragraph at page 49, lines 10-16, with the following rewritten paragraph:

Therefore, according to the ~~LCD~~ power source control method, the compulsory discharge of the residual charge of the liquid crystal display (LCD) 13 can be instantly terminated during the times between when the voltage detecting means (logic voltage detecting circuit 47) detects the voltage drop of the voltage VCC (circuit drive voltage) from the +5V power source of the logic circuit (operation portion controller 30) and when the circuit drive voltage becomes 0V.

Please replace the paragraph at page 50, lines 6-16, with the following rewritten paragraph:

Further, in the ~~LCD~~ power source control method, upon detecting a rise in the voltage VCC of the +5V power source of the logic circuit, the voltage detecting means (logic voltage detecting circuit 47) can be rendered to delay the output of the signal indicating the voltage rise (reset signal "H") for a fixed time (period T) until the voltage VCC of the logic circuit power source becomes stable at a predetermined voltage, whereby together with causing the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) to a power supplying state, the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) is controlled to be in the open state.

Please replace the paragraph at page 50, lines 17-21, with the following rewritten paragraph:

According to the ~~LCD~~ power source control method, deterioration of the logic circuit (operation portion controller 30) and the liquid crystal display (LCD) 13 is prevented when

the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) is rendered to the power supply state.

Please replace the paragraph at page 50, line 22 to page 51, line 22, with the following rewritten paragraph:

Still further, the ~~LCD~~ power source control circuit 49 employed in such a control method can include: a plurality of power sources (power source unit 28) structured so that at least 2 power sources or more are supplied, having the logic circuit power source (power source of +5V of the power source unit 28) in the module and the ~~LCD~~ drive power source (power source of +24V of the power source unit 28); the voltage detecting means (logic voltage detecting circuit 47) for detecting the voltage VCC of the logic circuit power source (power source of +5V); the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) for performing supply/interruption of a voltage from the ~~LCD~~ drive power source (power source of +5V) to the ~~LCD~~ control circuit (~~LCD~~ drive circuit); and the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) for forcibly discharging the residual charge of the ~~LCD~~ drive circuit when the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) is in interruption. In addition, the voltage detecting means (logic voltage detecting circuit 47) immediately outputs the signal indicating the voltage drop (reset signal "L") upon detecting a drop in the voltage VCC of the logic circuit power source (power source of +5V), whereby together with causing the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption means 50) to be in the interruption state, the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) is caused to be in the operation state to thereby forcibly discharge the residual charge of the ~~LCD~~ drive circuit by means of the

compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) before the voltage VCC of the logic circuit power source (power source of +5V) becomes 0V.

Please replace the paragraph at page 51, line 23 to page 52, line 2, with the following rewritten paragraph:

Therefore, according to the ~~LCD~~ power source control method, the compulsory discharge of the residual charge of the liquid crystal display (LCD) 13 can be instantly terminated during times between when the voltage detecting means (logic voltage detecting circuit 47) detects the voltage drop of the voltage (circuit drive voltage) VCC from the power source of +5V of the logic circuit (operation portion controller 30) and when the circuit drive voltage becomes 0V.

Please replace the paragraph at page 52, lines 3-18, with the following rewritten paragraph:

According to this result, for example, even if a relatively large number of capacitors are provided inside the LCD (liquid crystal display (LCD) 13) for the purpose of enhancing the display quality thereof, the discharge of the residual charge inside the LCD is performed instantaneously and forcibly when the supply of power to the LCD is interrupted at the time of power interruption. As a result, the fall of the ~~LCD~~ drive voltage (liquid crystal display drive voltage) is instantaneously performed so that the ~~LCD~~ drive voltage can become 0V before the logic circuit voltage becomes 0V. Therefore, the reverse flow of a current from the drive circuit of the liquid crystal display (LCD) 13 to the logic circuit (operation portion controller 30) when the operation of the liquid crystal display (LCD) 13 is OFF, that is, when the ~~LCD~~ power source supply/interruption means is performing interruption, is prevented.

Damage to the logic circuit and the liquid crystal display (LCD) 13 when the operation of the liquid crystal display (LCD) 13 is OFF is thus prevented.

Please replace the paragraph at page 52, line 19 to page 53, line 2, with the following rewritten paragraph:

Further, upon detecting a rise in the voltage VCC of the logic circuit power source (power source of +5V), the voltage detecting means (logic voltage detecting circuit 47) of the ~~LCD~~ power source control method can be rendered to delay the output of the signal indicating the voltage rise (reset signal "H") for a fixed time (period T) until the voltage VCC of the logic circuit power source becomes stable at a predetermined voltage, whereby together with causing the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) to a power supplying state, the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) is caused to be in the open state.

Please replace the paragraph at page 53, lines 3-8, with the following rewritten paragraph:

According to the ~~LCD~~ power source control circuit including such voltage detecting means (logic voltage detecting circuit 47), deterioration of the logic circuit (operation portion controller 30) and the liquid crystal display (LCD) 13 is prevented when the LCD power source supply/interruption means (~~LCD~~ drive power source supply/interruption means 50) is rendered to the power supply state.

Please replace the paragraph at page 53, lines 9-15, with the following rewritten paragraph:

Further, the ~~LCD~~ power source control circuit can be provided with the discharge electric current restriction means (discharge electric current restriction circuit 51) therein to prevent a large current from flowing between the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) and the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) when both means are in operation at the same time.

Please replace the paragraph at page 53, line 16 to page 54, line 6, with the following rewritten paragraph:

According to this structure, a maximum discharge electric current value flowing in the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) can be set to match the amount of the residual charge of the liquid crystal display (LCD) 13 to be used because the discharge electric current restriction means (discharge electric current restriction circuit 51) is provided therein. In addition, protection of the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) can be performed. In other words, when the residual charge of the liquid crystal display (LCD) 13 is discharged by means of the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52), the discharge electric current restriction means (discharge electric current restriction circuit 51) restricts the current flowing in the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) so that the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) is not destroyed, whereby damage to the compulsory discharge means (~~LCD~~

charge compulsory discharge circuit 52) due to the forced discharge of the residual charge can be prevented beforehand.

Please replace the paragraph at page 54, lines 7-24, with the following rewritten paragraph:

Still further, the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) is switched to the interruption state due to the signal (reset signal "L") indicating that the voltage detecting means (logic voltage detecting circuit 47) detects a voltage drop of the voltage VCC. Further, the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) can include a drive switching element (FET Q2) connected to the ~~LCD~~ power source (power source of the voltage VEE) which is switched to a discharge state due to the signal indicating that a voltage rise of the voltage VCC (reset signal "H"). In addition, the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) can include a discharge switching element (transistor Q4 or FET Q5) connected to earth. The discharge switching element (transistor Q4 or FET Q5) can be set so that it is rendered to the operating state due to the signal (reset signal "L") indicating that the voltage detecting means (logic voltage detecting circuit 47) detects a voltage drop of the voltage VCC and rendered to the open state due to the signal (reset signal "H") indicating that a voltage rise of the voltage VCC is detected.

Please replace the paragraph at page 54, line 25 to page 55, line 2, with the following rewritten paragraph:

According to this structure, the ~~LCD~~ power source of the +24V of the power source unit 28 can be interrupted or supplied to the ~~LCD~~ drive circuit (not shown) of the liquid crystal display (LCD) 13 with a simple structure. The discharge of the residual charge of the ~~LCD~~ drive circuit can also be performed with a simple structure.

Please replace the paragraph at page 55, lines 3-8, with the following rewritten paragraph:

Further, the discharge electric current restriction means (discharge electric current restriction circuit 51) can be a resistor (discharge electric current restriction resistor RL) connected in series between the ~~LCD~~ power source supply/interruption means (~~LCD~~ drive power source supply/interruption circuit 50) and the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52).

Please replace the paragraph at page 55, lines 9-26, with the following rewritten paragraph:

According to this structure, the resistor RL for restricting discharge electric current is provided therein. Therefore, a resistance value of the resistor RL is set to match the amount of the residual charge of the liquid crystal display (LCD) 13 to be used, whereby a maximum discharge electric current value flowing in the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) can be simply and easily set. In addition, protection of the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) can be performed. In other words, when the residual charge of the liquid crystal display (LCD) 13 is

discharged by means of the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52), the discharge electric current restriction resistor RL restricts the current flowing in the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) so that the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) is not destroyed, whereby damage to the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) owing to forced discharge of the residual charge can be prevented beforehand.

Please replace the paragraph at page 55, line 27 to page 56, line 4, with the following rewritten paragraph:

Still further, the ~~LCD~~ power source supply/interruption means (LCD drive power source supply/interruption means 50) can be provided with, in addition to the drive switching element (FET Q2), a first control switching element (transistor Q1), which is connected to earth, and a plurality of resistors (R1 to R3).

Please replace the paragraph at page 56, lines 9-13, with the following rewritten paragraph:

Further, the compulsory discharge means (~~LCD~~ charge compulsory discharge circuit 52) can be provided with a second control switching element (transistor Q3), which is connected to the control logic circuit power source, and a plurality of resistors (R4 to R6) in addition to the discharge switching element (transistor Q4 or FET Q5).

Please replace the Abstract, at page 66, lines 3-11, in its entirety with the following: